

## **Trace Fossils of the Cretaceous Bluesky Formation, Cadotte Area, Alberta**

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Wave-dominated estuaries are characterized by a complex association of sediments deposited in various sub-environments (ex: bayhead delta, central basin, tidal-flat, -channel, -inlet, -delta, barrier bar). Different stresses on benthic organisms across an estuary are numerous, including fluctuating water salinity, low overall salinity, high current energy, variable oxygenation, turbidity, and high sedimentation rates. These factors shape the trace fossil assemblage that is ultimately preserved in the rock record. Discerning the effects of these stresses on the trace fossil assemblage is difficult, especially if it is conceded that a burrowing organism's behavior is strongly influenced by sediment texture. This is further complicated by the differing preservation potential of deposits from various estuarine sub-environments.

In the subsurface near Peace River, Alberta, deposits interpreted as representing a large wave-dominated estuary are present in the Lower Cretaceous Bluesky Formation. An unusually well-preserved record of facies from various sub-environments has been documented including: the coarse-grained bayhead delta which is generally not burrowed; tidal flat deposits which are dominated by either sandstones or mudstones, highly burrowed, and cap vertical successions; sandy, rarely burrowed tidal channel deposits; locally burrowed, flood tidal delta sandstones; and finally, rarely to extensively burrowed barrier-bar/shoreface deposits. A notable 'stress-gradient' can be mapped from core facies. The stress gradient helps identify fluvial- and marine-dominated zones in the ancient embayment thereby enhancing resolution of reservoir sand bodies.